

REMARKS

Claims 1-7 are pending in the application with claim 1 being independent.

MITSURU AND BUKS DO NOT DESCRIBE THE CLAIMED CAPACITANCE

The Examiner rejected claims 1, 4, 5 and 7 under 35 U.S.C. 103(a) alleging that they are unpatentable over Mitsuru et al., JP Publication 2003-098205 (“Mitsuru”), in view of Buks, U.S. Patent No. 6,496,013 (“Buks”) and rejected claims 2 and 3 under 35 U.S.C. 103(a) as being unpatentable over Mitsuru in view of Buks and further in view of Brown, U.S. Patent No. 5,789,846 (“Brown”).

Claim 1 requires “a first capacitance between said auxiliary electrode and a ground is larger than a second capacitance between said first electrode and said second electrode, the first capacitance and the second capacitance being arranged in series.” In rejecting claim 1, the examiner admitted that Mitsuru fails to disclose that the capacitance between the auxiliary electrode and ground is larger than a capacitance between the first electrode and the second electrode. However, the examiner alleged that Buks describes this element.

Buks describes an additional capacitance between a first electrode and a circuit ground in parallel with a capacitance to be measured in order to measure a current going to the circuit ground. The additional capacitance is usually larger than the capacitance to be measured so as to reduce the variation of electric charge accumulated in the capacitance to be measured. *See* col. 1, lines 43-53. Buks does not disclose that the additional capacitance and the capacitance to be measured are arranged in series. Thus, Buks does not describe the claimed first and second capacitance, where the first capacitance is between an auxiliary electrode and a ground and the second capacitance is between the first electrode and second electrode, and the first and second capacitances are arranged in series.

In order to reduce the variation of the electric charge accumulated in the capacitance to be measured, Buks is designed to satisfy a relationship where $C2$ (additional capacitance) $> C1$ (capacitance to be measured) and preferably, $C2 \gg C1$, where the capacitance to be measured and the additional capacitance are arranged parallel to each other. However, since

Buks describes parallel capacitances, it does not describe the claimed capacitances where a first capacitance and a second capacitance are arranged in series and the first capacitance is greater than the second capacitance. Thus, Mitsuru and Buks, do not, either alone or in combination, describe each and every element of claim 1. *See also* Response filed March 3, 2010, pp. 6-8.

Furthermore the claimed capacitances increase the sensitivity of the electric field sensor by increasing the amplitude of the electric field within the electro optic crystal. As described in the specification, in a conventional electric field sensor, only a small part of the lines of electric force generated from the signal electrode (first electrode) passes through the electro optic crystal. Therefore, the amplitude of the electric field within the electro optic crystal is small, which prevents the polarization state of the optical beam from the light source from being modulated sufficiently. As a result, the electric field sensor does not provide high sensitivity. *See e.g.* [0030], FIGS. 5, 6.

One of the objects of the claimed invention is to “provide an electric field sensor that can obtain high sensitivity by increasing the amplitude of an electric field within an electro optic crystal.” [0033]. In the claimed electric field sensor, an additional capacitance (first capacitance) is arranged in series with respect to the capacitance to be measured (second capacitance between the first electrode and the second electrode which sandwiches the electric optic crystal). This arrangement concentrates the lines of electric force in the additional capacitance and the capacitance to be measured, which increases the amplitude of the electric field within the electro optic crystal. This results in increasing the sensitivity of the electric field sensor. *See* [0243], FIGS. 33, 34.

In a conventional capacitive test when the capacitance to be measured varies, an inrush current flows from the capacitance to be measured into other components in the testing circuit, which causes any deviations to be included in the test result. In order to solve this problem, Buks describes that an additional capacitance is arranged in parallel with the capacitance to be measured. This arrangement allows the inrush current to flow from the capacitance to be measured into the additional capacitance, which prevents the inrush current

from flowing into other components in the testing circuit. This results in increasing the sensitivity of the capacitive test. *See* col.1, lines 37-53.

In response to Applicants' arguments that Buks fails to disclose series capacitances where the first capacitance is larger than the second capacitance, the examiner alleged that "a capacitance with the ground acts as a charge flush on the system whether in series or parallel" and that by "providing a larger capacitance at this location, the charge present in the electro-optic crystal will be flushed more quickly. This would be necessary for quick, measurements since it would allow the electric field applied to the crystal to change faster, closer to instantaneous, without waiting for a delay from the previous charges to disperse." Office Action, p. 7. However, the claimed capacitances are not used to flush a charge present in the electro-optic crystal more quickly, but instead to increase the amplitude of the electric field within the electro optic crystal. Buks does not disclose or suggest that the additional capacitance is provided to increase the amplitude of the electric field within the capacitance to be measured. Nor does Mitsuru describe increasing the amplitude of the electric field within the electro optic crystal using the claimed capacitances.

In light of the foregoing, it is respectfully requested that the rejection under 35 U.S.C. 103 (a) of claim 1 be withdrawn. Claims 2-7 depend from claim 1 and are patentable for at least the same reasons as claim 1.

INTERVIEW SUMMARY

A telephone interview was conducted between the examiner, Examiner Gregory Toatley, and the undersigned on June 30, 2010. The differences between the claimed capacitances and Mitsuru and Buks were discussed. It is the undersigned's understanding that the examiner will withdraw the rejection of claim 1 based on Mitsuru and Buks.

CONCLUSION

In light of the foregoing, it is submitted that the claims are patentable and that the claims are in condition for allowance. No fees are believed due, however, the Commissioner

is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account 11-0855. If there are any issues that can be addressed via telephone, the Examiner is asked to contact the undersigned at (404) 815-6500.

Respectfully submitted,

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